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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

MCKINNON, TERRELL L

ART UNIT

PAPER NUMBER

3744

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/566,053	Applicant(s) GESKES ET AL.	
	Examiner TERRELL L. MCKINNON	Art Unit 3744	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 March 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 8/28/2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Response to Amendment

Receipt is acknowledged of applicant's amendment filed March 10, 2010. Claims 1-36 are pending and an action on the merits is as follows.

Applicant's arguments with respect to claims 1-36 have been considered but are moot in view of the new grounds of rejection.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

Art Unit: 3744

were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-4, 9-19, 21, 23, 26 and 28-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Daikin (EP 1070928) in view of Dahlgren (US 5,531,269).

Re. claim 1, Daikin discloses (referring to paragraph 40 of column 7, paragraph 64 of column 11 and fig. 1): A plate-type heat exchanger for motor vehicles, the heat exchanger being formed from heat transfer plates P 1, P2, alternately piled between two frames 2, 3 and integrally joined together by brazing; the plates cavities which are closed off outwardly being formed between and through which a first and a second medium flow A, B alternately in each case via at least one inflow line and outflow line, the plates being profiled in such a way that, between the respective profiles of the plates, contact points occur, in the region of which the plates are fastened to one another, wherein the profiles of the plates and their contact points are designed in such a way that the flow, formed between the plates, of the first and the second medium A, B from the corresponding inflow line to the corresponding out-flow line runs as "zigzag" (paragraphs 16-17, 40, 44, 61, 64).

Daikin's invention fails to disclose wherein the plates have a recurring wavy profile comprising legs running rectilinearly between regions of curvature.

However, Dahlgren teaches wherein the plates have a recurring wavy profile comprising legs running rectilinearly between regions of curvature.

Given the teachings of Dahlgren, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the heat exchanger of Daikin with wherein the plates have a recurring wavy profile comprising legs running rectilinearly between regions of curvature.

Doing so would provide a turbulent flow pattern to enhance heat transfer between the two fluids.

Re. Cls. 2-4, Daikin invention discloses all of the claimed limitations from above except for the plates having a recurring wavy profile in a zig-zag manner, the wavy profile has legs with length, leg angles between the legs, profile depth and regions of curvature.

However, Dahlgren teaches plates having a recurring wavy profile in a zig-zag manner the wavy profile has legs with length, leg angles between the legs, profile depth and regions of curvature (Fig. 2)

Given the teachings of Dahlgren, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the invention of Daikin with the plates having a recurring wavy profile in a zig-zag manner, the wavy profile has legs with length, leg angles between the legs, profile depth and regions of curvature.

Doing so would provide an increase heat transfer rate between the two fluids.

Re. Cl. 9, Daikin fails to disclose the leg length in the range of 8 mm to 15 mm.

Art Unit: 3744

However, Dahlgren teaches adjusting and designing the plate's wavy pattern (leg length) in such a way to meet the transfer needs of the heat exchanger (col. 2, lines 5- 14). Wherein, it would have been obvious to one of ordinary skill in the art to have a leg length in the range of 8 mm to 15 mm, for the purpose of accommodating the heat transfer needs of heat exchanger .

Re. Cl.10, Daikin discloses (referring to paragraph 43 of column 8): each of the heat transfer plates P1, P2 is form, of a substantially rectangular plate made of metal (such as stainless steel or aluminum) and has heat transfer enhancement surfaces formed by press working on its surfaces. The limitation plates being coated on at least one side with soldering aid material, is a very well known technique when joining hard surfaces together for bond, considering Daikin disclosure of joining plates together by brazing in claim 1.

Re. Cl. 11, Daikin discloses the plates have as inflow lines and outflow lines in each case a pair of bores perpendicularly with respect to the plate plane, the bores being raised with respect to the basic plane in such a way that there is a fluidic connection from one of the two bores alternately only to every second plate interspace", which has been disclosed (referring to paragraph 55-59 of column 10 and figs. 2-3, 5-6).

Re. Claim 12, Daikin discloses the raised region of at least some bores is surrounded by a region preferably leading around annularly and free of wavy profile (Fig. 7).

Art Unit: 3744

Re. Cl. 13, Daikin discloses bores having distributor ducts defined by wavy profiles with a leg angle which is increased as compared with the leg angle of the wavy profile (Figs. 5-7)

Re. Cl. 14, Daikin discloses the bores (21-24) assigned to the inflow lines are oval.

Re Cls. 15 and 16, Daikin fails to disclose wherein two plates, and/or wavy profile of one side of the plate, different from one another in terms of the wavy profile are used alternately, the wavy profiles differing from one another at least in terms of one of the features comprising leg length, leg angle and profile depth.

However, Dahlgren teaches plates having different pressing patterns and/or one plate having different patterns for providing proper heat transfer between two different fluids (Col. 1, lines 30-34 and Col. 4, lines 54-61).

Given the teachings of Dahlgren, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the invention of Daikin with the plates having wavy profile of one side of the plate, different from one another in terms of the wavy profile are used alternately, the wavy profiles differing from one another at least in terms of one of the features comprising leg length, leg angle and profile depth. Doing so would provide an increase heat transfer rate between the two fluids.

Re. Cl. 17, Daikin discloses the wavy profiles of adjacent plates are identical to one another (Figs. 2 and 3).

Re. Cl. 18, Daikin discloses the heat exchanger is formed from a stack of plates, the plates corresponding to one another and being arranged so as to be rotated

Art Unit: 3744

alternately through 180[deg.] with respect to one another (referring to paragraph 44 of column 8): the first heat transfer plate P1 and the second heat transfer plate P2 are piled in a manner that the front face of one heat transfer plate is opposed to the back face of the other.

Re. Cl. 19, Daikin discloses the plates have a bent edge, the edges of adjacent plates bearing one against the other and preferably being connected to one another by brazing paragraph 40, 43.

Re. Cl. 21, Daikin discloses the wavy profile extends into the edge, in particular over the edge (figs. 2-3).

Re. Cl. 23, Daikin discloses at least one end face of the heat exchanger is assigned a closing plate which is profileless, in particular, at least on the outside and which preferably has connection points for a first and second medium, said connection points issuing into connecting lines and being arranged in alignment with the bores (fig. 1).

Re. Cl. 26, Daikin discloses a heat exchanger, in particular oil cooler, for motor vehicles, the heat exchanger being formed from interconnected plates, there being formed between the plates cavities which are closed off outwardly and through which a first and a second medium flow alternately in each case via at least one inflow line and outflow line, the plates being profiled in such a way that, between the respective profiles of the plates, contact points occur, in the region of which the plates are fastened to one another, wherein the profiles of the plates and their contact points are designed in such a way that the flow, formed between the plates, of the first and the second medium from

Art Unit: 3744

the corresponding inflow line to the corresponding outflow line does not run rectilinearly wherein the contact points between two plates adjacent to one another are distributed uniformly over the plate surface (paragraphs 16-17, 40, 44, 61, 64).

Re. Cl. 28, Daikin discloses a phase transition of a medium takes place in plate interspaces (paragraph 65 of column 12).

Re. Cl. 29, Daikin discloses the installation position of the heat exchanger is determined such that the transverse distribution of the medium in the plate interspaces is assisted by gravitation (Figs. 1, 8 and 10).

Re. Cl. 30, Daikin discloses embossing the plates, stacking the plates one on the other and fastening them to one another by brazing (paragraph 40, 43 of column 8).

Re. Cl. 31, Daikin discloses the heat exchanger is formed from a stack of plates, the plates corresponding to one another and being arranged so as to be rotated alternately through 180[deg.] with respect to one another (referring to paragraph 44 of column 8): the first heat transfer plate P1 and the second heat transfer plate P2 are piled in a manner that the front face of one heat transfer plate is opposed to the back face of the other.

Re. Cl. 32, Daikin discloses brazing takes place wherein the plates are sealingly to one another at their edges, contact points of wavy profiles at the same time (paragraph 40 and 43).

Art Unit: 3744

5. Claims 5, 6, 7 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Daikin Industries LTD (EP 1070928) in view of Dahlgren (U.S. 5,531,269), as applied to claims above, and further in view of Wand (U.S. 5,462,113).

Re. Cls. 5 and 6 Daikin's invention as modified by Dahlgren, discloses all of the claimed limitations from above except for the wavy profile has a flat region on the outside of the wavy back, wherein the flat region is between 0.1 mm and 0.4 mm in a cross-section of the wavy profile.

However, Wand teaches plates having a wavy profile with flat regions (Figs. 7, 9, 10 and 11).

Given the teachings of Wand, it would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the plate heat exchanger of Daikin with wavy profile has a flat region on the outside of the wavy back, wherein the flat region is between 0.1 mm and 0.4 mm in a cross-section of the wavy profile.

Doing so would provide reliable contact points between adjacent plates for facilitating heat transfer between the fluids.

Re. Cl. 7, Daikin fails to disclose the leg angle being between 45 and 135 degrees.

ALFA-LAVAL teaches the leg angle is preferably between 45 and 135 degrees, preferably around 90 degrees (referring to line 31 page 5 to line 3 of page 6 and fig. 2): the ridges and valleys in the primary heat exchange part of the plates 12 and 13 form an angle of about 120 degrees with the center line M on the other side.

Art Unit: 3744

Given the teachings of ALFA-LAVAL, it would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the plate heat exchanger of Daikin with the leg angle being between 45 and 135 degrees.

Doing so would provide an efficient fluid flow angle for exchanging heat between Fluids.

Re. Cl. 20, Daikin discloses the plates have a bent edge, the edges of adjacent plates bearing one against the other and preferably being connected to one another by brazing paragraph 40, 43. Daikin fails to disclose up to five mutually overlapping plates. However, it would have been an obvious design choice to have up to five stacked plates for the purpose of accommodating a given design requirement.

6. Claims 8 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Daikin Industries LTD (EP 1070928) in view of Dahlgren (US 5,531,269) as applied to claims above and further in view of Joel et al. (U.S. 5,544,703).

Re. Cl. 8, Daikin fails to disclose a profile depth also the profile depth between liquid and gaseous media.

However, Joel teaches a plate type heat exchanger wherein the profile depth is altered for different fluid regions (col. 2, lines 60-63).

Given the teachings of Joel, it would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the plate heat exchanger of Daikin with a profile depth, also the profile depth between liquid and gaseous media.

Art Unit: 3744

Doing so would provide the proper flow rate between the fluids for satisfying a given exchange property.

Re. Cl. 22, Daikin fails to disclose between the end of the wavy profile and the edge, a profile-free bending portion is formed the width of which is smaller than 2 mm and is preferably determined in such a way that, during the brazing of the plates, the bending region is blocked with solder in wave crest portions in such way that a through flow of medium in the bending portion is reduced or essentially prevented.

However, Joel teaches between the end of the wavy profile and the edge, a profile-free bending portion is formed (col. 2, lines 36-45 and Figs. 5 and 6).

Given the teachings of Joel, it would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the plate heat exchanger of Daikin with the end of the wavy profile and the edge, a profile-free bending portion is formed the width of which is smaller than 2 mm and is preferably determined in such a way that, during the brazing of the plates, the bending region is blocked with solder in wave crest portions in such way that a through flow of medium in the bending portion is reduced or essentially prevented.

7. Claims 24, 25 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Daikin Industries LTD (EP 1070928) in view of Dahlgren (US 5,531,269) as applied to claims above and further in view of Leuthner et al. (U.S. 7,040,387).

Re. Cl. 24 and 25, Daikin, invention as modified by Dahlgren, fails to disclose hydraulic diameter percentages and average values of liquid and gaseous media.

However, Leuthner teaches adjusting hydraulic diameters to meet the heat transfer needs (col. 5, lines 15-16).

Given the teachings of Leuthner, it would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the plate heat exchanger of Daikin with hydraulic diameter percentages and average values of liquids and gaseous media.

Doing so would provide a heat absorbing or heat dissipating surface area for exchanging heat between fluids.

Re. Claim 27, Daikin discloses contact points between two plates (Para. 40 of col. 7 and Para. 64 of col. 11), but fails to disclose the contact points have a surface density of 4 to 7 per cm^2 . It would have been an obvious engineering design choice to one of ordinary skill in the art to have a surface density between 4 and 7 per cm^2 , for the purpose of satisfying a requirement for a particular outcome.

8. Claims 33-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Daikin Industries LTD (EP 1070928) in view of Dahlgren (US 5,531,269) as applied to claims above and further in view of Heil et al. (U.S. 6,389,696).

Re. Cls. 33-35, Daikin, invention as modified by Dahlgren, fails to disclose the wavy profile includes at least three regions of curvature and at least four legs; wherein the plates have first and second opposite side edges and first and second opposite end edges and wherein said wavy profile extends from said first side edge to said second

Art Unit: 3744

side edge and from said first end edge to said second end edge; and including at least two openings interrupting said wavy profile.

However, Heil teaches the wavy profile includes at least three regions of curvature and at least four legs; wherein the plates have first and second opposite side edges and first and second opposite end edges and wherein said wavy profile extends from said first side edge to said second side edge and from said first end edge to said second end edge; and including at least two openings interrupting said wavy profile (abstract; Fig. 1; col. 2; 14-33; col. 3; 5-19).

Given the teachings of Heil, it would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the plate heat exchanger of Daikin with the wavy profile includes at least three regions of curvature and at least four legs; wherein the plates have first and second opposite side edges and first and second opposite end edges and wherein said wavy profile extends from said first side edge to said second side edge and from said first end edge to said second end edge; and including at least two openings interrupting said wavy profile.

Doing so would provide a heat exchange plate, wherein the flow patterns are covers the entire plate surface area for uniform thermal fluid exchange to improve heat transfer.

9. Claim 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heil et al. (US 6,389,696) in view of Wand (US 5,462,113).

Re. Cl. 36, Heil discloses a heat exchanger for motor vehicles formed from interconnected plates, there being formed between the plates cavities connected to at least one inflow line and at least one outflow line to define first and second alternating flow paths, the plates being embossed with a zig-zag profile comprising leg portions connected by curved portions (abstract; Fig. 1; col. 2; 14-33; col. 3; 5-19).

Heil fails to teach the leg portions in section comprising ridges having flat tops and valleys having flat bottoms, portions of said flat tops of a first one of said plates contacting portions of the flat bottoms of an adjacent one of said plates a contact points, said contact points being arranged to prevent fluid from flowing between the first one of said plates and the second one of said plates rectilinearly from the inflow line to the outflow line.

However, Wand teaches ridges having flat tops and valleys having flat bottoms, portions of said flat tops of a first one of said plates contacting portions of the flat bottoms of an adjacent one of said plates a contact points (Figs. 7, 9, 10 and 11).

Given the teachings of Wand, it would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the plate heat exchanger of Heil with the leg portions in section comprising ridges having flat tops and valleys having flat bottoms, portions of said flat tops of a first one of said plates contacting portions of the flat bottoms of an adjacent one of said plates a contact points, said contact points being arranged to prevent fluid from flowing between the first one of said plates and the second one of said plates rectilinearly from the inflow line to the outflow line.

Doing so would provide reliable contact points between adjacent plates for facilitating heat transfer between the fluids.

Response to Arguments

Applicant's arguments filed March 10, 2010 have been fully considered but they are not persuasive.

Applicant's states, Daikin shows a heat exchanger that includes plates having a herringbone pattern of ridges. However, linear sections of these ridges meet at an angle, as illustrated in Figure 2, for example, and are not connected at regions of curvature as recited in amended claim 1. The remaining references also fail to show legs running rectilinearly between regions of curvature as recited in claim 1.

Applicant's argument is moot in view of Daikin in view of Dahlgren as cited above within this Office Action.

Applicant states, Daikin does not show uniformly distributed contact points as recited in claim 26, the art of record does not suggest modifying Daikin to include uniformly distributed contact points.

Daikin discloses ridges of one plate are uniformly joined to valleys of the other plate (paragraph 64).

Applicant's states, a heat exchanger having a wavy profile as claimed that extends from one side to the other and from one end to the other is not shown in the art of record.

Heil et al. (US 6,389,696) discloses the limitations of new claim 34, a heat exchanger plate having a wavy profile that extends from one side to the other and from one end to the other.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TERRELL L. MCKINNON whose telephone number is (571)272-4797. The examiner can normally be reached on Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl Tyler can be reached on 571-272-4834. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 3744

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June 7, 2010

/Terrell L Mckinnon/

Primary Examiner, Art Unit 3744